

**DATA EVALUATION RECORD
FRESHWATER SEDIMENT *Chironomus riparius* EMERGENCE TEST
(FOLLOWING OECD GUIDELINE 218)**

1. **CHEMICAL:** Transfluthrin

PC Code: 129140

2. **TEST MATERIAL:** Transfluthrin (tech.)

Purity: 97.7% (w:w)

3. **CITATION:**

Authors: Kuhl, K.

Title: *Chironomus riparius* 28-day chronic toxicity test with Transfluthrin (tech.) in a water-sediment system using spiked sediment.

Study Completion Date: January 27, 2015

Laboratory: Bayer CropScience AG
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Laboratory Report ID: E 218 4629-2

MRID No.: 49617845


DP Barcode: 436376

4. **REVIEWED BY:** Christie E. Padova, Staff Scientist, CDM/CSS-Dynamac JV

Signature: 

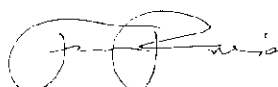
Date: 01/03/17

APPROVED BY: John Marton, Ph.D., Environmental Scientist, CDM/CSS-Dynamac JV

Signature: 

Date: 01/19/17

5. **APPROVED BY:** Frank T. Farruggia, Ph.D., Senior Scientist, EPA/OPP/EFED/ERB1

Signature:  2017.09.11
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Date: 9-11-2017

6. **DISCLAIMER:** This Data Evaluation Record may have been altered by the Environmental Fate and Effects Division subsequent to signing by CDM/CSS-Dynamac JV personnel.

7. STUDY PARAMETERS

Scientific Name of Test Organism: *Chironomus riparius*
 Age of Test Organism: 1st instar larvae, 2 to 3 days post-hatch
 Definitive Test Duration: 28 days
 Study Method: Static with aeration
 Type of Concentrations: TWA bulk sediment, TWA sediment-OC normalized,
 TWA overlying water

8. CONCLUSIONS:

Results Synopsis:

Statistical Endpoint	Bulk Sediment (mg ai/kg)	OC-Normalized (mg ai/kg OC)	Overlying Water (µg ai/L)
28-d Emergence Rate	NOAEC: 0.317 LOAEC: 0.704	NOAEC: 15.5 LOAEC: 34.3	NOAEC: 0.15 LOAEC: 0.35
Male:Female	NOAEC: 0.058 LOAEC: 0.100	NOAEC: 2.84 LOAEC: 4.88	NOAEC: 0.0353 LOAEC: 0.063
28-d Development Rate (Combined)	NOAEC: 0.188 LOAEC: 0.317	NOAEC: 9.19 LOAEC: 15.5	NOAEC: 0.084 LOAEC: 0.15
28-d Development Rate (Male)	NOAEC: 0.100 LOAEC: 0.188	NOAEC: 4.88 LOAEC: 9.19	NOAEC: 0.063 LOAEC: 0.084
28-d Development Rate (Female)	NOAEC: 0.100 LOAEC: 0.188	NOAEC: 4.88 LOAEC: 9.19	NOAEC: 0.063 LOAEC: 0.084

Assessment endpoints: male:female ratio, emergence rate, and development rate (sex-specific and combined)

Most sensitive endpoints: male:female ratio

9. ADEQUACY OF THE STUDY:

A. Classification: This study is **scientifically sound** and is classified as **acceptable**.

B. Rationale: This study followed methods described in OECD Guideline 218 (adopted 2004): “Sediment-Water Chironomid Toxicity Test Using Spiked Sediment”, and

does not fulfill any current U.S. EPA data requirement.

C. Reparability: N/A

10. **MAJOR GUIDELINE DEVIATIONS (from OECD Guideline 218):**

No major guideline deviations were observed that would affect the scientific soundness of this study. However, the following minor guideline deviation(s) were observed:

- Sediment and pore water matrices were isolated using vacuum filtration. Absorption of the test substance to the glass fibre filters, if any, was unknown/not reported.

11. **MATERIALS AND METHODS**

Stability of Compound under Test Conditions: Concentrations of transfluthrin were measured in treated sediment on Day -2 (prior to test system establishment), and in overlying water, pore water, and sediment of the test systems on Days 0, 7, and 28. Recoveries from sediment analyzed on Day -2 were 58.8 to 80.7% of nominal concentrations. Results from test systems sampled during the study indicated that transflurthrin remained predominantly associated with the sediment.

In sediment on Days 0, 7 and 28, recoveries were generally low, but relatively consistent at all levels, with reviewer-calculated coefficients of variation (CV) of 9 to 13% (see Appendix 1 for copy of Excel worksheet). At the nominal 0.10, 0.18, 0.32, 0.56 and 1.00 mg ai/kg dw treatment levels, concentrations of transfluthrin ranged from 0.050 to 0.064, 0.089 to 0.110, 0.164 to 0.197, 0.283 to 0.352 and 0.642 to 0.785 mg ai/kg, respectively. For all levels (Days 0 through 28), recoveries ranged from 49.4 to 78.5% of nominal concentrations.

In overlying water, recoveries were low (<1% of nominal concentrations) and decreased with time. At the nominal 0.10, 0.18, 0.32, 0.56 and 1.00 mg ai/kg dw treatment levels, concentrations of transfluthrin were 0.064, 0.11, 0.21, 0.38 and 0.79 µg ai/L, respectively, on Day 0 (0.22 to 0.32% of nominal) and <0.0625 (<LOQ), 0.075, 0.093, 0.18 and 0.47 µg ai/L, respectively, on Day 7 (0.12 to 0.19% of nominal). Overlying water concentrations were <LOQ at all treatment levels by Day 28.

In pore water samples, transfluthrin was measurable only at the two highest treatment levels: at the 0.56 mg ai/kg level at 0.0625 µg ai/L on Day 0 (0.002% of nominal), and at the 1.00 mg ai/kg level at 0.14 and 0.12 µg ai/L on Days 0 and 7, respectively (0.004 and 0.003% of nominal, respectively). For all other levels and intervals, recoveries of transfluthrin were <LOQ (i.e., <0.0625 µg ai/L).

Physicochemical properties of transfluthrin.

Parameter	Values	Comments
Water solubility at 20°C	0.057 mg/L	From concurrently-submitted MRID 49617846
Vapor pressure	Not reported	
UV absorption	Not reported	
pKa	Not reported	
Kow	Not reported	

OECD requires water solubility, stability in water and light, pK_a , P_{ow} , and vapor pressure of the test compound.

A. Test Organisms/Acclimation

Guideline Criteria	Reported Information
<u>Species</u> <i>Chironomus riparius</i>	<i>Chironomus riparius</i>
<u>Source</u>	Egg masses were obtained from the laboratory's culture facility (maintained since July 2006)
<u>Culture Conditions</u> A reproduction and oviposit chamber should consist of an adult area, sufficiently large to allow swarming (minimum 30 x 30 x 30 cm), and an oviposit area. Crystallizing dishes or larger containers with a thin layer of quartz sand (5 to 10 mm) or Kieselgur (thin layer to a few mm) spread over the bottom and containing suitable water to a depth of several cm are suitable as an oviposit area. Environmental conditions: temperature 20±2°C; 16:8 hours light:dark (intensity ca. 1000 lux); air humidity ca. 60%	For breeding, the midges were kept in cages (40 x 40 x 40 cm) with gauze on each side of the cage. A glass basin (19 cm diameter and 8 cm height) was set on the bottom of each cage, and the bottom of the basin was covered with a thin layer of "Kieselgur" (silica) and 4 to 5 cm of reconstituted water (Elendt M7 medium). The water was gently aerated. Cultures were maintained at 20 ± 2°C and on a 16-hour light:8-hour dark photoperiod (500 to 1000 lux).

Guideline Criteria	Reported Information
<u>Egg Mass Acclimation Period</u> Four to five days before test initiation freshly laid egg masses should be taken from cultures and maintained separately in culture medium, temperature change should not exceed 2°C per day.	Fresh egg masses were incubated (under the same conditions) in small dishes with test medium.
<u>Age of Test Larvae</u> First instar (1 to 4 days post-hatch with confirmation)	1 st instar, 2 to 3 days post-hatch
<u>Food</u> Green algae (e.g., <i>Scenedesmus subspicatus</i> , <i>Chlorella vulgaris</i>) or flaked fish food as a ground powder, suspension, or filtrate	The hatched larvae were fed green algae and an aqueous suspension of a plant material based fish food (Tetra Phyll®).
<u>Health of parent culture stock</u> Were parent chironomids in good health during the culture period?	Not reported

B. Test System

Guideline Criteria	Reported Information
<u>Test Materials</u>	Test item: transfluthrin (tech.) IUPAC name: 2,3,5,6-tetrafluorobenzyl (1 <i>R</i> ,3 <i>S</i>)-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropanecarboxylate CAS name: (2,3,5,6-tetrafluorophenyl)methyl (1 <i>R</i> ,3 <i>S</i>)-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate CAS No.: 118712-89-3 Description: white solid Batch No.: PNLS000112 Purity: 97.7% (w:w) Storage: 10 to 30°C

Guideline Criteria	Reported Information
<p><u>Type of Test System</u> Static (static-renewal or flow-through of overlying water is evaluated on a chemical-specific basis). Distilled or deionized water may be added to overlying water once daily as needed to maintain volume.</p>	<p>Static with aeration. When necessary (typically once per week), test vessels were refilled to the mark with deionized water.</p>
<p><u>Test Water</u> Soft reconstituted water or water from a natural source is preferred. De-chlorinated tap water may be used if the test organism will survive in it for the duration of the culturing and testing without showing signs of stress.</p>	<p>Reconstituted water (Elendt M7 medium) was prepared with de-ionized water and mineral salts and vitamins; a detailed chemical composition was provided.</p> <p><u>Control water characterization (Day -2):</u> Total hardness: 213.6 mg/L as CaCO₃ Alkalinity: 53.4 mg/L as CaCO₃ pH: 7.8 Oxygen saturation: 97.4% (8.7 mg/L)</p>
<p><u>Test Sediment</u> Formulated (reconstituted, artificial, or synthetic) sediment is recommended. Content of sediment by dry weight: 5% peat (dry) (pH 5.5-6.0) or alpha-cellulose, 75% quartz sand (>50% in size range of 50-200 microns), 20% kaolinite clay (kaolinite content ca. 30%), CaCO₃ 0.05-0.1%). Moisture content 30-50%, TOC 2% (±0.5%) and pH 6.5 - 7.5. Natural sediment can be used if it is fully characterized, unpolluted, and free of organisms that might compete with or consume chironomids. (If solvent other than water will be used, sand content of artificial sediment is adjusted accordingly.)</p>	<p>Formulated (artificial) sediment was prepared on a dry weight basis 7 days prior to study initiation using the following components: 75.0% quartz sand (91.4% of particles were in the range of 50-200 µm), 4% air-dried sphagnum moss peat (pH 3.5), 20% kaolinite (kaolinite content of 30.2%, pH 5.5 to 7.5), 1% calcium carbonate (to adjust the pH to 7 ± 0.5) and 48% de-ionized water.</p> <p><u>Sediment characterization (Day -7):</u> TOC: 2.05% Moisture content: 32.8% pH: 6.7</p>

Guideline Criteria	Reported Information
<p><u>Sediment Spiking</u></p>	<p>Suitable amounts of prepared stock solutions (in acetone) were mixed with suitable amounts of fine quartz sand for each treatment level (10 g/test vessel). The solvent was allowed to evaporate completely, and the treated sand was mixed with suitable amounts of sediment using a feed mixer. Additional solvent control and control sets were prepared parallel to the treatment sets (with the same number of replicates).</p>
<p><u>Sediment Conditioning</u> <u>Artificial sediment:</u> 7 days in flowing dilution water prior to test initiation, chambers may be aerated</p>	<p>Test vessels (sediment:water) were prepared 2 days prior to insertion of the test animals.</p> <p>The systems were gently aerated and maintained at $20 \pm 2^{\circ}\text{C}$ during the conditioning period.</p>
<p><u>Introduction of Test Organisms</u> Twenty-four hours prior to test initiation aeration of chambers is stopped and organisms are added to the chambers. Aeration should not resume for at least 24 hours.</p>	<p>At test initiation (Day 0), midge larvae were impartially added to each replicate test vessel. Aeration was stopped during (and for a 24-hr period following) the addition of larvae.</p>
<p><u>Solvents</u> If used, minimal (i.e., ≤ 0.1 ml/l) and same concentration in all treatments. Suitable solvents are acetone, ethanol, methanol, ethylene glycol monoethyl ether, ethylene glycol dimethyl ether, dimethylformamide or triethylene glycol. (OECD guidelines also allows use of dispersants: Cremophor RH40, Tween 80, methycellulose 0.01%, and HCO-40)</p>	<p>Acetone, 5 mL/kg dw sediment</p> <p>The solvent was allowed to evaporate during the spiking procedure.</p>
<p><u>Water Temperature</u> $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ (Should not deviate between vessels by more than 1°C.)</p>	<p>19.9 to 20.4°C (mean of $20.2 \pm 0.1^{\circ}\text{C}$)</p>

Guideline Criteria	Reported Information
<p><u>pH</u> <u>Sediment</u>: 7.0 ± 0.5 <u>Interstitial Water</u>: <u>Overlying Water</u>: 6.0 to 9.0 (Should not vary by more than 1 unit during test)</p>	<p><u>Sediment</u>: 6.7 (Day -7) <u>Interstitial Water</u>: Not reported <u>Overlying Water</u>: 7.9 to 8.5</p>
<p><u>TOC</u> <u>Sediment</u>: $2 \pm 0.5\%$ <u>Overlying Water</u>: 2 mg/L</p>	<p><u>Sediment</u>: 2.05% (Day -7) <u>Overlying Water</u>: Not reported</p>
<p><u>Ammonia</u> <u>Interstitial Water</u>: <u>Overlying Water</u>:</p>	<p><u>Interstitial Water</u>: Not reported <u>Overlying Water</u>: 1.12 to 1.24 mg/L on Day 0 and 15.7 to 19.1 mg/L on Day 28</p>
<p><u>Total Water Hardness</u> 200 mg/L as CaCO_3 (prefer 160 to 180 mg/L as CaCO_3)</p>	<p>249.2 to 284.8 mg/L as CaCO_3 (OECD 218 specifies that total hardness not exceed 400 mg/L as CaCO_3)</p>
<p><u>Dissolved Oxygen</u> 60% air saturation value throughout test</p>	<p>7.8 to 8.6 mg/L (<i>ca.</i> $\geq 89\%$ saturation)</p>
<p><u>Aeration</u> Aeration (<i>ca.</i> one bubble/sec) is allowed except for when larvae are being added and for at least 24 hours after introduction of test organisms to a test chamber. If one test chamber is aerated all test chambers must be treated the same.</p>	<p>Continuous gentle aeration (<i>ca.</i> 2 bubbles per second) was provided through a glass pipette situated <i>ca.</i> 2.5 cm above the sediment layer. Aeration was stopped during insertion of larvae and recommenced 24 hours later.</p>
<p><u>Test Vessels or Compartments</u> 1. <u>Material</u>: Glass, No. 316 stainless steel, teflon or perfluorocarbon plastics 2. <u>Size</u>: Sediment depth of 1.5- 3 cm and the depth ratio of sediment to water should be <i>ca.</i> 1:4, must not be $>1:4$; 600 ml beaker with 8 cm diameter</p>	<p>1. Glass beakers 2. 0.6 L (9.5 cm diameter), containing a 1.5-cm layer of sediment (<i>ca.</i> 140 g) and a 6.0-cm layer of overlying water (0.38 L). The sediment to water depth ratio was 1:4.</p>

Guideline Criteria	Reported Information
<u>Covers</u> Test vessels should be covered with a glass plate.	Test vessels were covered with clear plastic plates to minimize evaporation.
<u>Photoperiod</u> 16 hours light, 8 hours dark (Light intensity 500 to 1000 lux)	16-hour light/8-hour dark photoperiod (Light intensity of 833 lux)
<u>Food</u> Green algae (e.g., <i>Scenedesmus subspicatus</i> , <i>Chlorella vulgaris</i>) or flaked fish food as a ground powder, suspension, or filtrate	Aqueous suspension of TetraPhyll®, an ornamental fish food
<u>Food Concentration and Frequency</u> Preferably feed daily but at least 3 times per week. <u>day 1 to 10:</u> 0.25-0.5 mg per larvae per day <u>remainder of test:</u> 0.5-1 mg per larvae per day (keep to a minimum, should not accumulate on sediment surface, cause overlying water to be cloudy or cause drop in DO)	Generally 3 times per week 0.5 to 1 mg TetraPhyll® per larvae per day

C. Test Design

Guideline Criteria	Reported Information
<u>Duration</u> <i>Chironomus riparius</i> : 28 days (if midges emerge early the test can be terminated after a minimum of 5 days after emergence of the last adult in the control).	28 days

Guideline Criteria	Reported Information
<p><u>Nominal Concentrations</u> Negative control, solvent control (if a solvent was used) and at least 5 test concentrations. (Note exception to dilution factors described below can be made for shallow slope responses but minimum number of test concentrations may need to be increased)</p> <p><u>ECx endpoint:</u> test concentrations should bracket ECx and span the environmental concentration range. Dilution factor should not be greater than two between exposure concentrations.</p> <p><u>NOEC/LOEC endpoint:</u> factor between concentrations must not be greater than 3.</p>	<p>0 (negative control), 0 (solvent control), 0.10, 0.18, 0.32, 0.56 and 1.00 mg ai/kg dw sediment</p> <p>A nominal factor rate of 1.8 was used for both ECx and NOAEC determinations.</p>
<p><u>Number of Test Organisms**</u> <u>ECx endpoint:</u> 60 larvae per treatment level; 3 replicates per treatment level</p> <p><u>NOAEC/LOAEC endpoint:</u> at least 80 larvae per treatment level with at least 4 replicates per treatment level (adequate power to detect a 20% difference, Type I error rate 5%)</p> <p><u>** (Optional)</u> If data on 10-day growth and survival are needed additional replicates (number based on ECx or NOEC/LOEC endpoint determination) should be included at test initiation.</p>	<p>80 larvae per level: 20 larvae per replicate x 4 replicates per level (used for both ECx and NOAEC determinations).</p> <p>Additional replicates (with chironomids) were prepared at each level for analytical sampling on Days 0 and 7 (a single biological replicate was collected on Day 28), and a single replicate (per concentration) was prepared (with chironomids) to measure the temperature, pH and oxygen content in the overlying water during the study.</p> <p><u>** (Optional)</u> 10-day growth data were not collected.</p>
<p>Test organisms randomly or impartially assigned to test vessels?</p>	<p>Yes</p>

Guideline Criteria	Reported Information
<p><u>Overlying Water Parameter Measurements</u></p> <p>1. Dissolved oxygen should be measured daily in all test chambers.</p> <p>2. Temperature and pH should be measured in all test chambers at the start and end of the test and at least once a week during the test.</p> <p>3. Temperature should be monitored at least hourly throughout the test in one test chamber.</p> <p>4. Hardness and ammonia should be measured in the controls and one test chamber at the highest concentration at the start and end of the test.</p>	<p>1. DO was measured in surrogate test vessels twice per week (on Days 0, 4, 7, 11, 14, 18, 21 and 25) and in all biological test vessels on Day 28.</p> <p>2.-3. Temperature was measured in surrogate test vessels once a week (on Days 0, 7, 14, 21 and 28), and continuously monitored in one control vessel throughout exposure. The pH was measured in surrogate test vessels once per week (on Days 0, 7, 14, 21 and 28) and in all biological test vessels on Day 28.</p> <p>4. Total hardness and total ammonia were measured in unspecified vessels of the control and highest treatment level (1.00 mg ai/L) on Days 0 and 28.</p>
<p><u>Chemical Analysis</u></p> <p><u>Overlying water:</u> at a minimum must be analyzed at test initiation (i.e., one hour after introduction of test substance into the test chamber) and at the end of the test in at least the highest concentration and one lower concentration.</p> <p><u>Sediment and interstitial water:</u> at a minimum must be analyzed at the end of the test in at least the highest concentration and one lower concentration.</p>	<p>For each level, surrogate test vessels were collected on Days 0 and 7, and one biological test vessel was collected for analysis on Day 28.</p> <p>Samples of isolated overlying water, pore water and sediment were analyzed for transfluthrin using GC/MS.</p>
<p><u>Interstitial Water and Sediment Isolation Method</u></p> <p>Centrifugation (e.g., 10,000 g and 4°C for 30 min) is recommended. If test substance is demonstrated not to adsorb to filters, filtration may be acceptable.</p>	<p>Vacuum-filtration (1.0-µm mesh glass microfiber filter)</p>

12. REPORTED RESULTS**A. General Results**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes. This study was conducted in compliance with the current OECD Principles of GLP and with the Principles of GLP according to Annex 1 of the German Chemical Law (ChemG) with the following exception: routine analysis of the de-ionized water for residues and contaminants.
<u>Control Mortality</u> <30%	Yes
Did chironomids emerge in controls between day 12 and 23?	Generally yes; chironomids emerged in controls between Days 14 and 24.
<u>Control Emergence</u> Mean emergence between 50-70%	Negative control – 90% emergence Solvent control – 90% emergence
<u>Data Endpoints</u> <u>Emergence Test (28 day)</u> <ul style="list-style-type: none"> - Number alive - Time to emergence - Number of emerged male and female midges - Number of visible pupae that have failed to emerge - Number of egg masses deposited - Observations of other effects, abnormal behavior, or appearance or clinical signs (e.g., leaving sediment, unusual swimming) <u>Growth and Survival (10-day) (Optional)</u> <ul style="list-style-type: none"> - Number alive - Instar level of surviving larvae - Dry weight (ash free) per test chamber of surviving larvae by instar level 	<u>Emergence Test (28 day)</u> <ul style="list-style-type: none"> - Number alive - Time to emergence - Number of emerged male and female midges - Number of visible pupae that have failed to emerge - Observations of other effects, abnormal behavior, or appearance or clinical signs (e.g., leaving sediment, unusual swimming) <u>Growth and Survival (10-day)</u> N/A

Guideline Criteria	Reported Information
<u>Percent Recovery of Chemical:</u>	<p>Procedural recoveries (QC samples) conducted concurrently with sample analysis (results were not corrected for procedural recoveries):</p> <p><u>Sediment:</u> Spiked at 10 and 1000 µg/kg Mean recovery range = 85 to 93% (n = 6) LOQ = 10 µg ai/kg</p> <p><u>Water:</u> Spiked at 0.0625 and 0.625 µg/L Mean recovery range = 87 to 93% (n = 4) LOQ = 0.0625 µg ai/L</p>
Raw data included?	Yes, sufficient

Effects Data

Toxicity Observations: The percent of emerged chironomids averaged 90, 90, 94, 90, 94, 81 and 0% (corresponding to mean emergence rates of 1.254, 1.292, 1.321, 1.254, 1.321, 1.139 and 0.000) for the initial measured 0 (negative control), 0 (solvent control), 0.064, 0.110, 0.164, 0.352 and 0.785 mg ai/kg sediment treatment levels, respectively. Differences were reported to statistically-significant ($\alpha = 0.05$) compared to the pooled control (90% or 1.273) at the 0.352 and 0.785 mg ai/kg treatment levels. Based on initial measured sediment concentrations, the reported NOAEC and LOAEC for emergence rate were 0.164 and 0.352 mg ai/kg, respectively, and the calculated EC₁₀ and EC₂₀ values (with 95% C.I.) were 0.302 (0.184 to 0.393) mg ai/kg and 0.351 (0.236 to 0.455) mg ai/kg, respectively.

The Chi-square test ($\alpha = 0.05$) indicated no statistically-different distribution (in number emerged) between sexes compared to the assumption of 50% females and 50% males. Therefore, males and females were pooled for development rate calculations to increase statistical power. Development rates averaged 0.057, 0.058, 0.058, 0.060, 0.055 and 0.052 days⁻¹ for the initial measured 0 (negative control), 0 (solvent control), 0.064, 0.110, 0.164 and 0.352 mg ai/kg sediment treatment levels, respectively (no emergence occurred at the 0.785 mg ai/kg level). The difference was reported to be statistically-significant ($\alpha = 0.05$) compared to the pooled control (0.058 days⁻¹) at the 0.352 mg ai/kg treatment level. Based on initial measured sediment concentrations, the reported NOAEC and LOAEC for development rate were 0.164 and 0.352 mg ai/kg, respectively, and the calculated EC₁₀ and EC₂₀ values (with 95% C.I. if calculable) were 0.377 (0.233 to >0.785) mg ai/kg and >0.785

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mg ai/kg, respectively.

Table 1. Summary of transfluthrin (tech.) effects on *Chironomus riparius* emergence success, sex ratio and development rate.

Toxicant Concentration			Initial No.	Mean Number Emerged			Percent Emergence (%)		
Nominal Sediment (mg/kg dw)	Initial Measured Sediment (mg ai/kg dw)	TWA Sediment (mg ai/kg dw) ^(a)		♂	♀	Total	♂	♀	Total
Negative control	<LOQ	<LOQ	80	28	44	72	35.00	65.00	90.00
Solvent control	<LOQ	<LOQ	80	36	36	72	45.00	45.00	90.00
Pooled control	---	---	160	64	80	144	40.00	50.00	90.00
0.10	0.064	0.058	80	27	48	75	33.75	60.00	93.75
0.18	0.110	0.100	80	38	34	72	47.50	42.50	90.00
0.32	0.164	0.188	80	41	34	75	51.25	42.50	93.75
0.56	0.352	0.317	80	34	31	65	42.50	38.75	81.25
1.00	0.785	0.704	80	0	0	0	0.00	0.00	0.00

* Statistically-significant difference compared to the pooled control ($p < 0.05$; Williams Multiple Sequential t-test).

^(a) Reviewer-calculated time-weighted averages (TWA; refer to Appendix I for copy of Excel spreadsheet). The LOQ for sediment samples was 0.01 mg ai/kg dw.

^(b) $ER_{\text{♂}}$ = number of emerged males/number of emerged larvae; $ER_{\text{♀}}$ = number of emerged females/number of emerged larvae.

^(c) Mean development rate = $\sum_{i=1}^m \frac{f_i x_i}{n_e}$ where: i = index of inspection interval; m = maximum number of inspection intervals; f_i = number of midges emerged in the inspection interval i ; n_e = total number of midges emerged; and

$x_i = \frac{1}{\left(\frac{\text{day}_i + l_i}{2}\right)}$ which is the development rate of the midges emerged in interval i ; day_i = inspection day (days since application); and l_i = length of inspection interval i (days, 1 day in this study)

No abnormal observations (e.g., dead larvae or pupae, which failed to show full development and to emerge) were observed throughout the study.

B. Statistical Results (From Study Report)

Sex ratio, emergence rate and development rate were statistically analyzed. Analyses were

performed using ToxRat Professional statistical software and reported in terms of initial sediment concentrations. Emergence rate data were arcsine transformed prior to analysis.

Sex ratio data were analyzed using the Chi-square contingency test. No statistically-different distribution (in number emerged) was indicated between sexes compared to the assumption of 50% females and 50% males, and males and females were pooled for development rate calculations to increase statistical power.

Negative and solvent control emergence rate and development rate data were compared using Student's t-test for homogeneous variances ($\alpha = 0.05$, two-sided). No significant differences were observed for either endpoint; thus, control data were pooled for subsequent comparisons.

Emergence rate and development rate data were assessed for normality using the Shapiro-Wilk's test and for homogeneity of variance using Levene's Test ($\alpha = 0.05$). The data for both endpoints passed both assumptions and were subsequently analyzed using the parametric Williams Multiple Sequential t-test Procedure ($\alpha = 0.05$).

Effective concentrations (EC_{10} , EC_{15} and EC_{20}) for emergence rates were calculated using probit analysis.

Most sensitive endpoint(s): emergence rate and development rate

Endpoint	Methods	LC/ EC_{50} (95% CI) (mg ai/kg)	NOAEC (mg ai/kg)	LOAEC (mg ai/kg)
28-d Emergence Rate	William's Multiple Sequential t-test	Not reported	0.164	0.352
28-d Development Rate			0.164	0.352
10-d Survival (Optional)	---	---	---	---
10-d Growth (Optional)	---	---	---	---

13. VERIFICATION OF STATISTICAL RESULTS

The reviewer analyzed emergence, development rate (sex-specific and combined), and male:female ratio using CETIS statistical software version 1.8.7.12 with database backend settings implemented by EFED on 10/20/2015. Negative and solvent control data were compared using a two-sample t-test assuming equal variance. No differences were detected and all subsequent analyses were conducted by comparing treatment data to the negative control only. Data were then tested for normality of variance using the Shapiro-Wilk test ($\alpha = 0.01$) and for homogeneity of variance using Bartlett's test ($\alpha = 0.01$). Emergence rate did not meet these assumptions and was therefore analyzed using the non-parametric Mann-Whitney U Two-Sample and Jonckheere-Terpstra tests. All other endpoints met these assumptions and were analyzed using analysis of variance followed by Dunnett's multiple comparison test. Male:female ratio was analyzed twice using one-way analyses both times, but with increasing and decreasing assumptions. All analyses were conducted using the reviewer-calculated TWA bulk sediment concentrations, but results were also expressed as the TWA OC-normalized sediment and TWA overlying water concentrations. Transfluralin was only detected in pore water at the top two doses, so results could not be expressed based on pore water for any endpoint except emergence (NOAEC and LOAEC of 0.035 and 0.089 $\mu\text{g ai/L}$, respectively).

Summary of Statistical Methods used for NOAEC/LOAEC Analyses.

Endpoint	Solvent vs Dilution Control		NOAEC/LOAEC	
	Method	Diff ⁽¹⁾ (%)	Method	Diff ⁽²⁾ (%)
28-d Emergence Rate	Equal Variance t-Test	0	Mann-Whitney/ Jonckheere	9.72
Male:Female	Equal Variance t-Test	-46.8	Dunnett/ Williams	-73.4
28-d Development Rate (Combined)	Equal Variance t-Test	-2.74	Dunnett/ Williams	3.00
28-d Development Rate (Male)	Equal Variance t-Test	-1.03	Dunnett/ Williams	-3.05
28-d Development Rate (Female)	Equal Variance t-Test	-0.79	Dunnett/ Williams	-5.15

⁽¹⁾ Difference between the mean dilution water and negative control responses.

⁽²⁾ Difference between the dilution water and NOAEC concentration treatment.

Most sensitive endpoint: male:female ratio

Verification Statistical Endpoint Values^(a).

Statistical Endpoint	Bulk Sediment (mg ai/kg)	OC-Normalized (mg ai/kg OC)	Overlying Water (µg ai/L)
28-d Emergence Rate	NOAEC: 0.317 LOAEC: 0.704	NOAEC: 15.5 LOAEC: 34.3	NOAEC: 0.15 LOAEC: 0.35
Male:Female	NOAEC: 0.058 LOAEC: 0.100	NOAEC: 2.84 LOAEC: 4.88	NOAEC: 0.0353 LOAEC: 0.063
28-d Development Rate (Combined)	NOAEC: 0.188 LOAEC: 0.317	NOAEC: 9.19 LOAEC: 15.5	NOAEC: 0.084 LOAEC: 0.15
28-d Development Rate (Male)	NOAEC: 0.100 LOAEC: 0.188	NOAEC: 4.88 LOAEC: 9.19	NOAEC: 0.063 LOAEC: 0.084
28-d Development Rate (Female)	NOAEC: 0.100 LOAEC: 0.188	NOAEC: 4.88 LOAEC: 9.19	NOAEC: 0.063 LOAEC: 0.084

^(a) Results are based on mean reviewer-calculated TWA concentrations.

14. REVIEWER'S COMMENTS:

The study was designed to fulfill OECD Guideline 218 *Sediment-Water Chironomid Toxicity Test Using Spiked Sediment* (2004). Although this study does not fulfill any current U.S. EPA guideline requirement, there were no significant deviations from OECD Guideline 218 that would affect the scientific soundness of this study, as all validity requirements delineated in OECD 218 guidance for a chironomid emergence toxicity test were fulfilled.

Time weighted average (TWA) concentrations of the sediment, overlying water and pore water matrices were reviewer-calculated (refer to associated Excel worksheet in Appendix I) and results in terms of TWA concentrations are also included in the Conclusion section of the DER. TWA concentrations were calculated using the following equation:

$$C_{TWA} = \frac{\left(\frac{C_1 + C_0}{2}\right)(t_1 - t_0) + \left(\frac{C_2 + C_1}{2}\right)(t_2 - t_1) + \left(\frac{C_{n-1} + C_2}{2}\right)(t_{n-1} - t_2) + \left(\frac{C_n + C_{n-1}}{2}\right)(t_n - t_{n-1})}{t_n}$$

where:

C TWA is the time-weighted average concentration,

C j is the concentration measured at time interval j (j = 0, 1, 2,...n)

t j is the number of hours (or days or weeks, units used just need to be consistent in the equation) of the test at time interval j (e.g., t 0 = 0 hours (test initiation), t 1 =24 hours, t 2 =96 hours).

As per U.S. EPA request, results were also provided in the Conclusions section of the DER in terms of OC-normalized TWA sediment concentrations. OC-normalized TWA sediment concentrations (reviewer-calculated using the TOC ratio of 0.0205 and rounded to three significant figures) were 2.84, 4.88, 9.19, 15.5 and 34.3 mg ai/kg OC for the TWA 0.058, 0.100, 0.188, 0.317 and 0.704 mg ai/kg treatment levels, respectively. The reviewer's results are reported in the Conclusions section of this DER.

In this study, treatment-level results for emergence rate and development rate were compared to the performance of the pooled controls, whereas EPA requires comparisons are made to the negative control level.

The experimental study dates were March 13 to April 17, 2014.

15. REFERENCES:

ToxRat® Solutions GmbH. 2010. ToxRat® Professional”, Version 2.10.05 (release Feb. 20, 2010), 52477 Alsdorf, Germany.

ToxRat® Solutions GmbH. 2009. ToxRat® Validation Report (release December 1, 2009), valid for ToxRat® Version 2.10.

Silke, G. 2014. Acute Toxicity of 3,5-Dichlorophenol to larvae of *Chironomus riparius* (non-GLP). Bayer CropScience AG. Unpublished report ID.: HOK 214007, M-492490-01-1.

APPENDIX I. COPY OF REVIEWER'S TWA CALCULATIONS (USING EXCEL):**SEDIMENT**

	Measured Concentration (mg ai/kg)			Time-Weighted Average			OC-Norm
Nominal Concentration (mg ai/kg)	Day 0	Day 7	Day 28	(mg ai/kg)	Std. Dev.	CV (%)	mg ai/kg OC
Negative Control	<0.01	<0.01	<0.01	<0.01			
Solvent Control	<0.01	<0.01	<0.01	<0.01			
0.10	0.064	0.063	0.050	0.058	0.008	13	2.84
0.18	0.110	0.106	0.089	0.100	0.011	11	4.88
0.32	0.164	0.197	0.185	0.188	0.017	9	9.19
0.56	0.352	0.334	0.283	0.317	0.036	11	15.5
1.00	0.785	0.730	0.642	0.704	0.072	10	34.3

OVERLYING WATER

	Measured Concentration (ug ai/L)			Time-Weighted Average		
Nominal Concentration (mg ai/kg)	Day 0	Day 7	Day 28	(ug ai/L)	Std. Dev.	CV (%)
Negative Control	<0.0625	<0.0625	<0.0625	<0.0625		
Solvent Control	<0.0625	<0.0625	<0.0625	<0.0625		
0.10	0.064	0.0312	0.0312	0.0353	0.019	54
0.18	0.11	0.075	0.0312	0.063	0.039	63
0.32	0.21	0.093	0.0312	0.084	0.091	108
0.56	0.38	0.18	0.0312	0.15	0.175	117

DP Barcode: 436376

MRID No.: 49617845

1.00	0.79	0.47	0.0312	0.35	0.381	110
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PORE WATER

Nominal Concentration (mg ai/kg)	Measured Concentration (ug ai/L)			Time-Weighted Average	Std. Dev.	CV (%)
	Day 0	Day 7	Day 28	(ug ai/L)		
Negative Control	<0.0625	<0.0625	<0.0625	<0.0625		
Solvent Control	<0.0625	<0.0625	<0.0625	<0.0625		
0.10	<0.0625	<0.0625	<0.0625	<0.0625		
0.18	<0.0625	<0.0625	<0.0625	<0.0625		
0.32	<0.0625	<0.0625	<0.0625	<0.0625		
0.56	0.0625	0.0312	0.0312	0.035	0.018	51
1.00	0.14	0.12	0.0312	0.089	0.058	65

When necessary, 1/2 the LOQ (or 0.0312 ug ai/L) was used for calculation purposes.

CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 1 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 07-1912-6648	Endpoint: Combined Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:34	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C <> T	NA	NA	9.84%	Passes combined development rate

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Solvent Blank	0.701	2.45	0.006	6	0.5094	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.00000512	0.00000512	1	0.492	0.5094	Non-Significant Effect
Error	0.000062475	1.04125E-05	6			
Total	0.000067595		7			

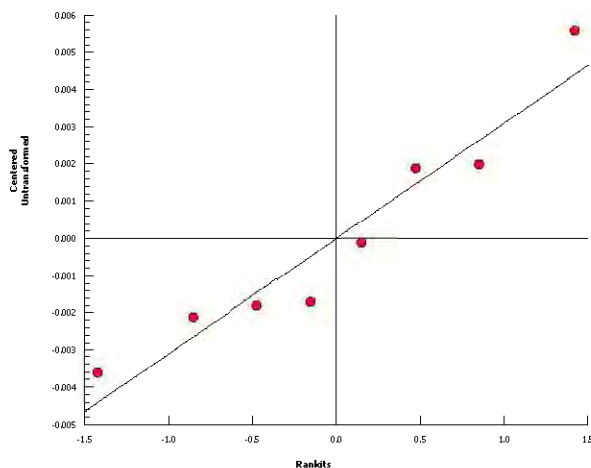
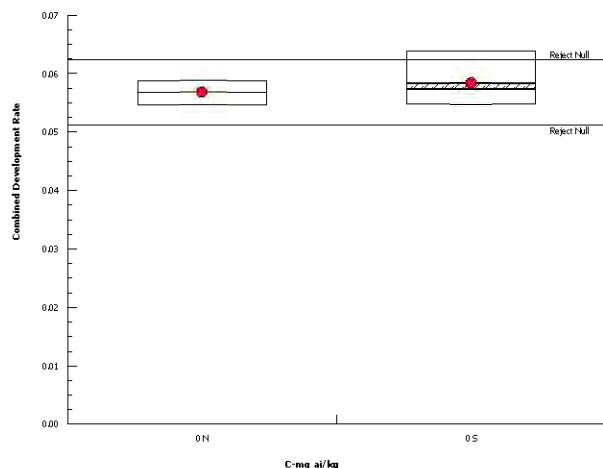
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.19	47.5	0.3661	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.925	0.645	0.4712	Normal Distribution

Combined Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.0583	0.052	0.0647	0.0574	0.0547	0.0639	0.00199	6.83%	0.0%
0	Negative Control	4	0.0567	0.0532	0.0603	0.0568	0.0546	0.0587	0.00111	3.93%	2.74%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 2 of 16)
 Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 14-1577-9135	Endpoint: Combined Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	5.18%	0.188	0.317	0.2441	

Dunnett Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.682	2.36	0.003	6	0.9471	CDF	Non-Significant Effect
		0.1	-2.95	2.36	0.003	6	0.9999	CDF	Non-Significant Effect
		0.188	1.36	2.36	0.003	6	0.2457	CDF	Non-Significant Effect
		0.317*	3.51	2.36	0.003	6	0.0054	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000143113	3.577825E-05	4	11.5	0.0002	Significant Effect
Error	4.65725E-05	3.104833E-06	15			
Total	0.0001896855		19			

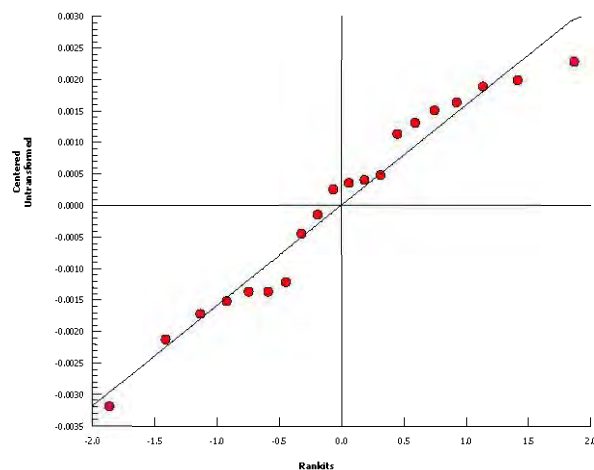
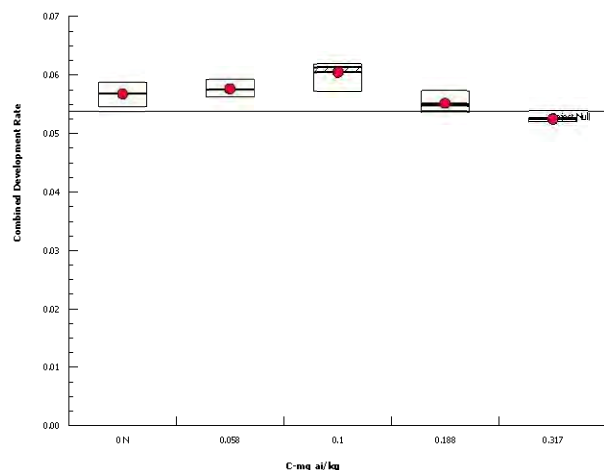
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.41	13.3	0.1703	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.952	0.866	0.3986	Normal Distribution

Combined Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.0567	0.0532	0.0603	0.0568	0.0546	0.0587	0.00111	3.93%	0.0%
0.058		4	0.0576	0.055	0.0601	0.0575	0.0562	0.0592	0.0008	2.78%	-1.5%
0.1		4	0.0604	0.0569	0.0639	0.0613	0.0572	0.0619	0.00109	3.62%	-6.48%
0.188		4	0.055	0.0522	0.0578	0.0547	0.0535	0.0573	0.000877	3.19%	3.0%
0.317		4	0.0524	0.0518	0.0529	0.0524	0.0519	0.0527	0.000185	0.71%	7.71%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 3 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 02-0784-4476	Endpoint: Combined Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Ord. Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	4.13%	0.188	0.317	0.2441	

Williams Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.682	1.75	0.002	6	>0.05	CDF	Non-Significant Effect
		0.1	-1.82	1.84	0.002	6	>0.05	CDF	Non-Significant Effect
		0.188	1.36	1.87	0.002	6	>0.05	CDF	Non-Significant Effect
		0.317*	3.51	1.88	0.002	6	<0.05	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000143113	3.577825E-05	4	11.5	0.0002	Significant Effect
Error	4.65725E-05	3.104833E-06	15			
Total	0.0001896855		19			

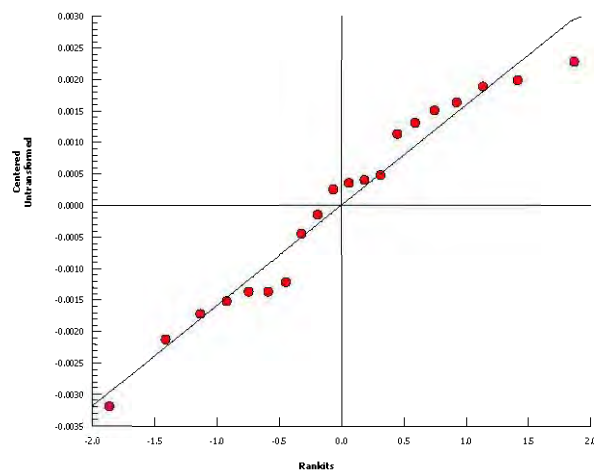
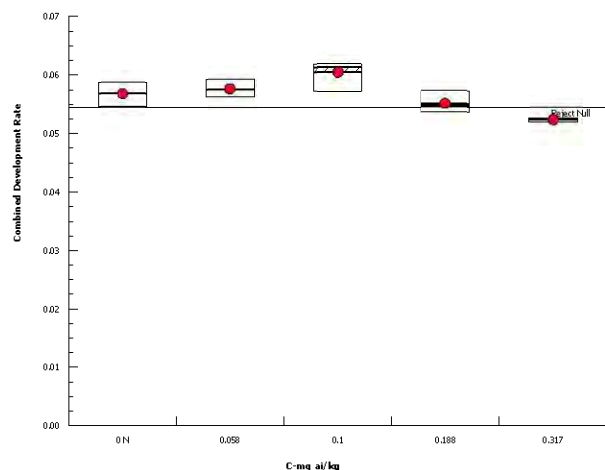
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.41	13.3	0.1703	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.952	0.866	0.3986	Normal Distribution

Combined Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.0567	0.0532	0.0603	0.0568	0.0546	0.0587	0.00111	3.93%	0.0%
0.058		4	0.0576	0.055	0.0601	0.0575	0.0562	0.0592	0.0008	2.78%	-1.5%
0.1		4	0.0604	0.0569	0.0639	0.0613	0.0572	0.0619	0.00109	3.62%	-6.48%
0.188		4	0.055	0.0522	0.0578	0.0547	0.0535	0.0573	0.000877	3.19%	3.0%
0.317		4	0.0524	0.0518	0.0529	0.0524	0.0519	0.0527	0.000185	0.71%	7.71%

Graphics



OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 08-1244-4182	Endpoint: Female Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:34	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C <> T	NA	NA	9.26%	Passes female development rate

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Solvent Blank	0.21	2.45	0.005	6	0.8403	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	3.6125E-07	3.6125E-07	1	0.0443	0.8403	Non-Significant Effect
Error	4.89375E-05	8.15625E-06	6			
Total	4.929875E-05		7			

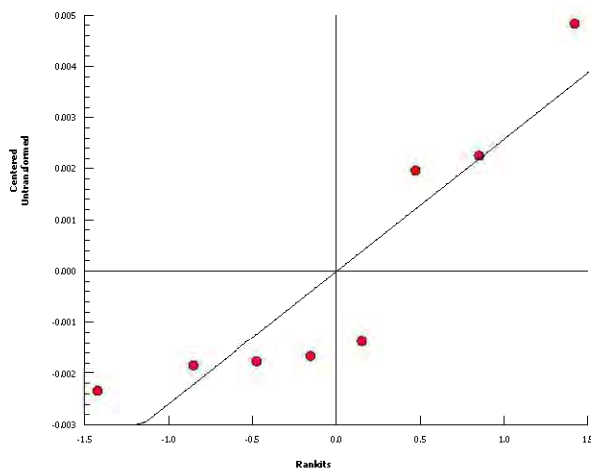
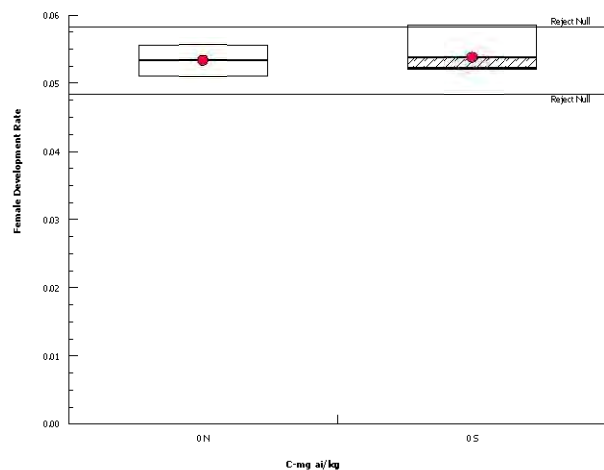
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	1.75	47.5	0.6578	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.813	0.645	0.0393	Normal Distribution

Female Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.0538	0.0486	0.0589	0.0522	0.052	0.0586	0.00161	5.99%	0.0%
0	Negative Control	4	0.0533	0.0495	0.0572	0.0534	0.051	0.0556	0.00122	4.57%	0.79%

Graphics



OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 07-2018-2686	Endpoint: Female Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	5.96%	0.188	0.317	0.2441	

Dunnett Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.889	2.36	0.003	6	0.9673	CDF	Non-Significant Effect
		0.1	-2.04	2.36	0.003	6	0.9985	CDF	Non-Significant Effect
		0.188	1.93	2.36	0.003	6	0.1056	CDF	Non-Significant Effect
		0.317*	3.07	2.36	0.003	6	0.0128	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000125668	0.000031417	4	8.62	0.0008	Significant Effect
Error	0.00005467	3.644667E-06	15			
Total	0.000180338		19			

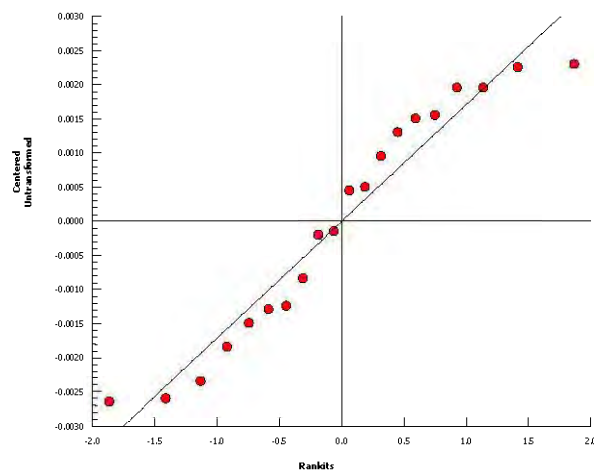
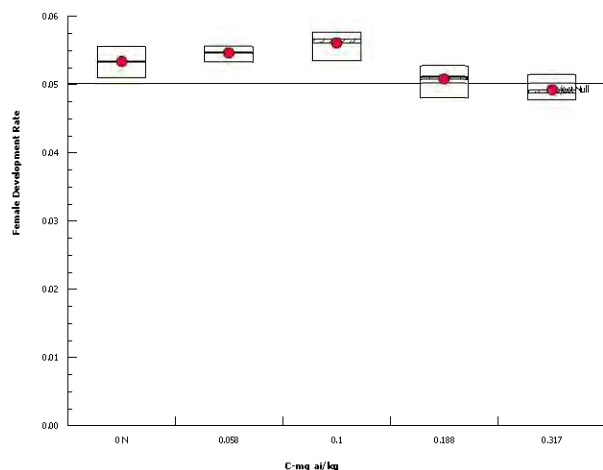
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.2	13.3	0.6989	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.924	0.866	0.1192	Normal Distribution

Female Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.0533	0.0495	0.0572	0.0534	0.051	0.0556	0.00122	4.57%	0.0%
0.058		4	0.0546	0.053	0.0561	0.0547	0.0533	0.0555	0.000473	1.74%	-2.25%
0.1		4	0.0561	0.0531	0.0591	0.0566	0.0535	0.0576	0.000946	3.37%	-5.15%
0.188		4	0.0507	0.0473	0.0542	0.0511	0.0481	0.0527	0.00108	4.25%	4.87%
0.317		4	0.0492	0.0464	0.052	0.0488	0.0477	0.0515	0.000889	3.61%	7.78%

Graphics



OPPTS 850.1760 Chronic Sediment Chironomus

Bayer Crop Science GmbH

Analysis ID: 03-9093-0021	Endpoint: Female Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Ord. Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	4.76%	0.1	0.188	0.1371	

Williams Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.889	1.75	0.002	6	>0.05	CDF	Non-Significant Effect
		0.1	-1.46	1.84	0.002	6	>0.05	CDF	Non-Significant Effect
		0.188*	1.93	1.87	0.003	6	<0.05	CDF	Significant Effect
		0.317*	3.07	1.88	0.003	6	<0.05	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000125668	0.000031417	4	8.62	0.0008	Significant Effect
Error	0.00005467	3.644667E-06	15			
Total	0.000180338		19			

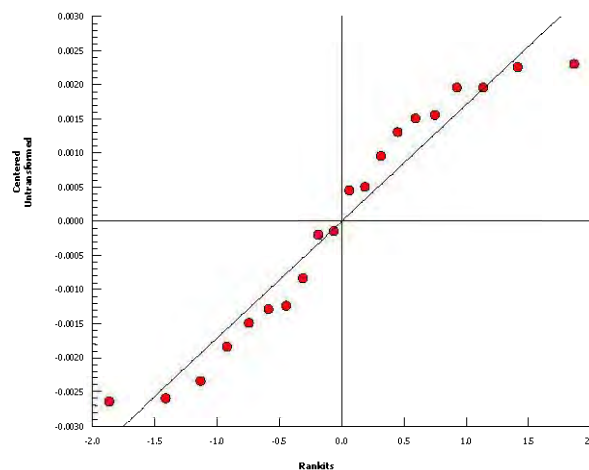
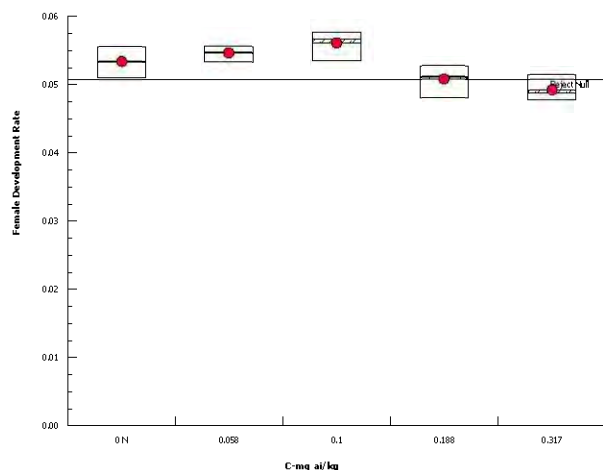
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.2	13.3	0.6989	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.924	0.866	0.1192	Normal Distribution

Female Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.0533	0.0495	0.0572	0.0534	0.051	0.0556	0.00122	4.57%	0.0%
0.058		4	0.0546	0.053	0.0561	0.0547	0.0533	0.0555	0.000473	1.74%	-2.25%
0.1		4	0.0561	0.0531	0.0591	0.0566	0.0535	0.0576	0.000946	3.37%	-5.15%
0.188		4	0.0507	0.0473	0.0542	0.0511	0.0481	0.0527	0.00108	4.25%	4.87%
0.317		4	0.0492	0.0464	0.052	0.0488	0.0477	0.0515	0.000889	3.61%	7.78%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 7 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 13-8031-0334	Endpoint: Male Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:34	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C <> T	NA	NA	5.89%	Passes male development rate

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Solvent Blank	0.433	2.45	0.004	6	0.6799	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000000845	0.000000845	1	0.188	0.6799	Non-Significant Effect
Error	0.00002699	4.498334E-06	6			
Total	0.000027835		7			

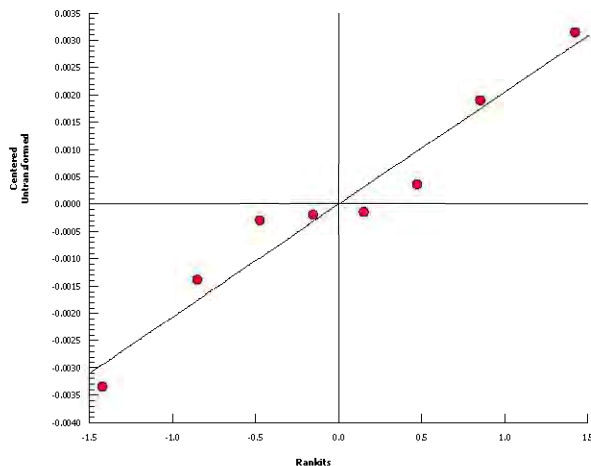
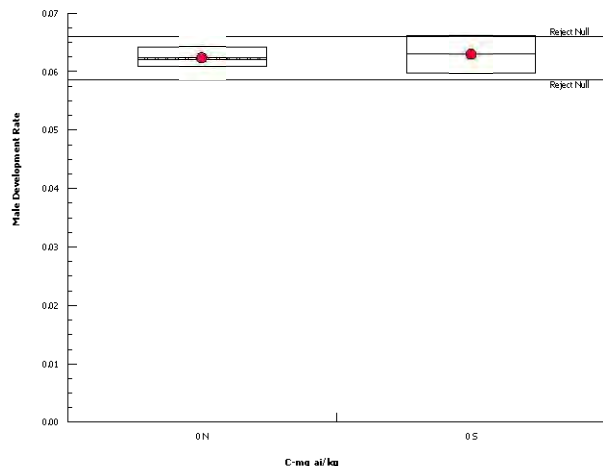
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3.74	47.5	0.3078	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.961	0.645	0.8212	Normal Distribution

Male Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.0629	0.0587	0.0672	0.0631	0.0596	0.0661	0.00133	4.23%	0.0%
0	Negative Control	4	0.0623	0.0601	0.0645	0.062	0.0609	0.0642	0.000689	2.21%	1.03%

Graphics



OPPTS 850.1760 Chronic Sediment Chironomus

Bayer Crop Science GmbH

Analysis ID: 08-4234-5223	Endpoint: Male Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	5.74%	0.188	0.317	0.2441	

Dunnett Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.643	2.36	0.004	6	0.9421	CDF	Non-Significant Effect
		0.1	-1.25	2.36	0.004	6	0.9869	CDF	Non-Significant Effect
		0.188	2.29	2.36	0.004	6	0.0563	CDF	Non-Significant Effect
		0.317*	4.81	2.36	0.004	6	0.0004	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000229777	5.744425E-05	4	12.5	0.0001	Significant Effect
Error	0.000069075	0.000004605	15			
Total	0.000298852		19			

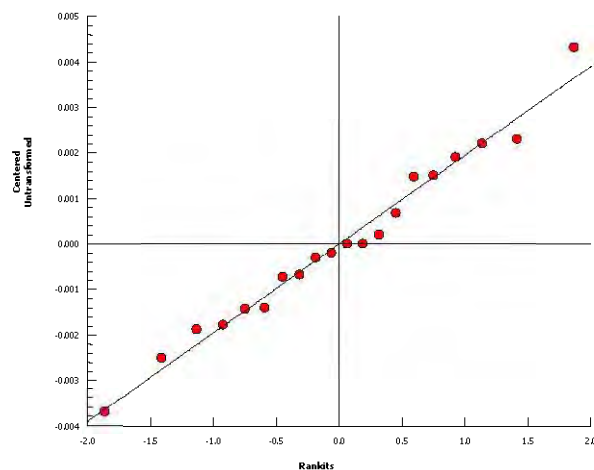
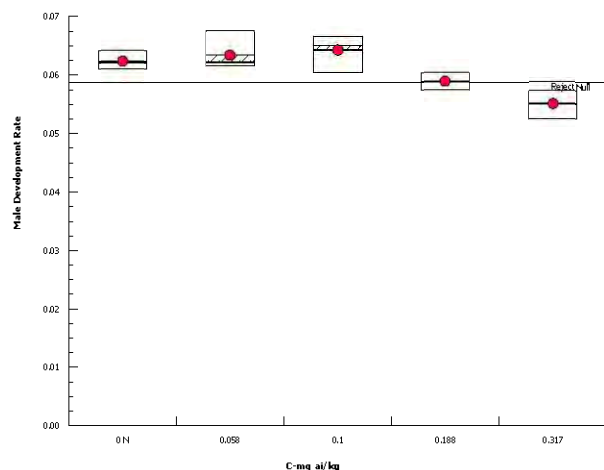
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.67	13.3	0.6151	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.985	0.866	0.9803	Normal Distribution

Male Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.0623	0.0601	0.0645	0.062	0.0609	0.0642	0.000689	2.21%	0.0%
0.058		4	0.0633	0.0586	0.0679	0.062	0.0614	0.0676	0.00147	4.64%	-1.57%
0.1		4	0.0642	0.06	0.0684	0.065	0.0605	0.0664	0.00132	4.1%	-3.05%
0.188		4	0.0588	0.0567	0.0609	0.0588	0.0574	0.0603	0.000658	2.24%	5.58%
0.317		4	0.055	0.0519	0.0581	0.0551	0.0525	0.0573	0.000982	3.57%	11.7%

Graphics



OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 07-8402-8738	Endpoint: Male Development Rate	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Ord. Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	4.58%	0.1	0.188	0.1371	

Williams Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.643	1.75	0.003	6	>0.05	CDF	Non-Significant Effect
		0.1	-0.947	1.84	0.003	6	>0.05	CDF	Non-Significant Effect
		0.188*	2.29	1.87	0.003	6	<0.05	CDF	Significant Effect
		0.317*	4.81	1.88	0.003	6	<0.05	CDF	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.000229777	5.744425E-05	4	12.5	0.0001	Significant Effect
Error	0.000069075	0.000004605	15			
Total	0.000298852		19			

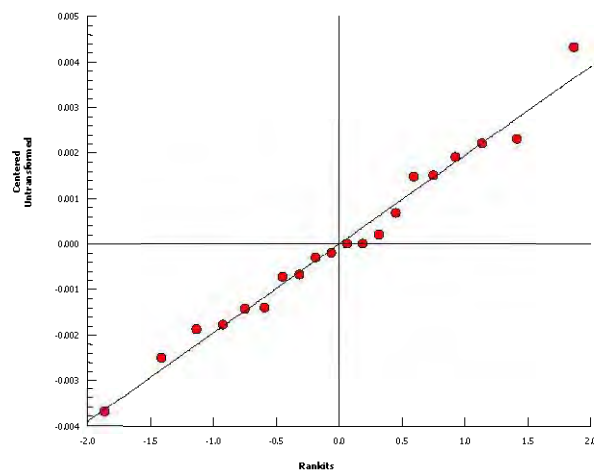
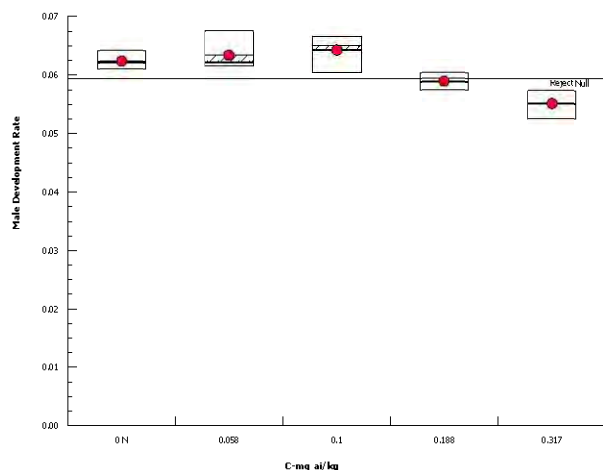
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	2.67	13.3	0.6151	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.985	0.866	0.9803	Normal Distribution

Male Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.0623	0.0601	0.0645	0.062	0.0609	0.0642	0.000689	2.21%	0.0%
0.058		4	0.0633	0.0586	0.0679	0.062	0.0614	0.0676	0.00147	4.64%	-1.57%
0.1		4	0.0642	0.06	0.0684	0.065	0.0605	0.0664	0.00132	4.1%	-3.05%
0.188		4	0.0588	0.0567	0.0609	0.0588	0.0574	0.0603	0.000658	2.24%	5.58%
0.317		4	0.055	0.0519	0.0581	0.0551	0.0525	0.0573	0.000982	3.57%	11.7%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 10 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 21-2424-6620	Endpoint: Male to Female Ratio	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:33	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C <> T	NA	NA	163.0%	Passes male to female ratio

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Solvent Blank	1.32	2.45	1.06	6	0.2352	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.6498	0.6498	1	1.74	0.2352	Non-Significant Effect
Error	2.23975	0.3732917	6			
Total	2.88955		7			

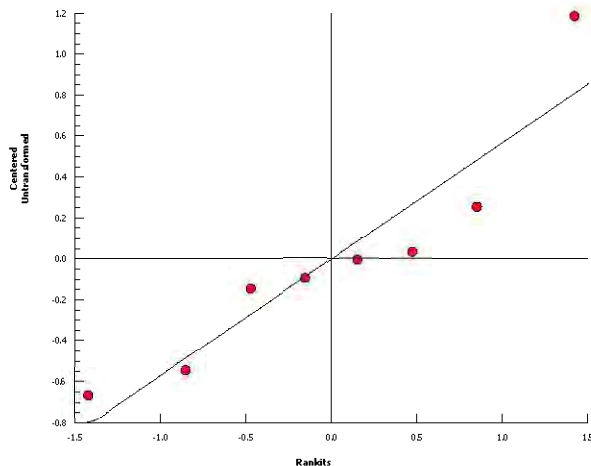
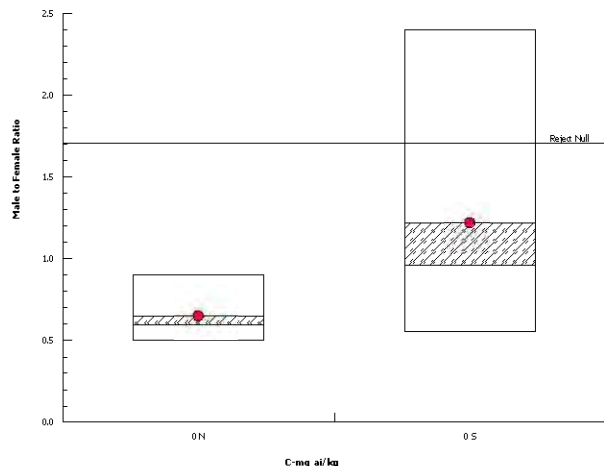
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	22.6	47.5	0.0293	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.886	0.645	0.2165	Normal Distribution

Male to Female Ratio Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	1.22	-0.128	2.56	0.96	0.55	2.4	0.423	69.4%	0.0%
0	Negative Control	4	0.647	0.364	0.931	0.595	0.5	0.9	0.089	27.5%	46.8%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 11 of 16)
 Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 14-5925-0562	Endpoint: Male to Female Ratio	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:34	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	87.3%	0.317	>0.317	NA	

Dunnett Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	0.167	2.36	0.565	6	0.7418	CDF	Non-Significant Effect
		0.1	-1.98	2.36	0.565	6	0.9982	CDF	Non-Significant Effect
		0.188	-2.59	2.36	0.565	6	0.9997	CDF	Non-Significant Effect
		0.317	-2.06	2.36	0.565	6	0.9986	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.51082	0.377705	4	3.28	0.0404	Significant Effect
Error	1.7277	0.11518	15			
Total	3.23852		19			

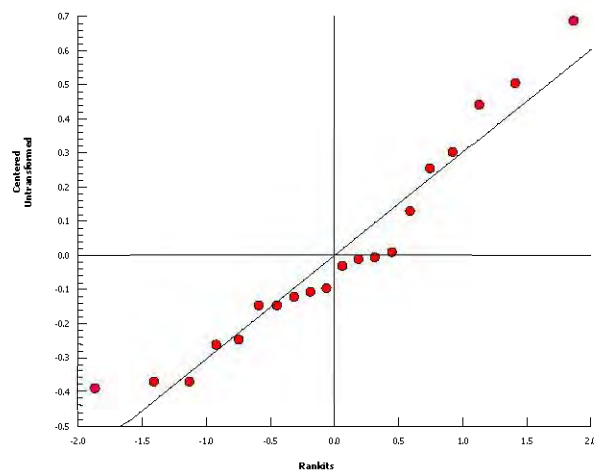
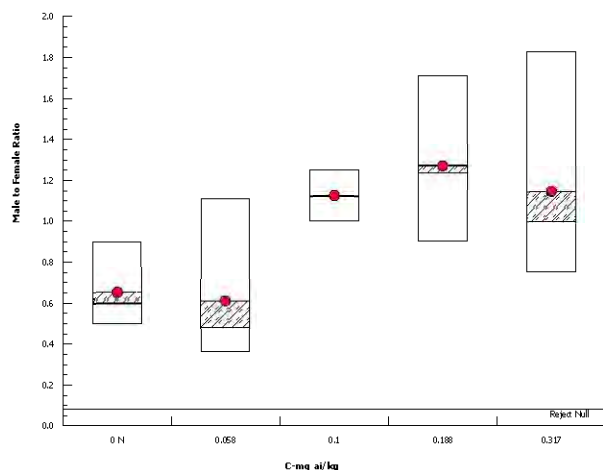
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.62	13.3	0.1571	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.928	0.866	0.1405	Normal Distribution

Male to Female Ratio Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.647	0.364	0.931	0.595	0.5	0.9	0.089	27.5%	0.0%
0.058		4	0.608	0.0663	1.15	0.48	0.36	1.11	0.17	56.0%	6.18%
0.1		4	1.12	0.96	1.29	1.12	1	1.25	0.0512	9.13%	-73.4%
0.188		4	1.27	0.584	1.96	1.24	0.9	1.71	0.216	33.9%	-96.1%
0.317		4	1.14	0.376	1.91	0.995	0.75	1.83	0.241	42.2%	-76.4%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 12 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 16-8260-0285	Endpoint: Male to Female Ratio	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	87.3%	0.1	0.188	0.1371	

Dunnett Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.167	2.36	0.565	6	0.8494	CDF	Non-Significant Effect
		0.1	1.98	2.36	0.565	6	0.0966	CDF	Non-Significant Effect
		0.188*	2.59	2.36	0.565	6	0.0322	CDF	Significant Effect
		0.317	2.06	2.36	0.565	6	0.0839	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.51082	0.377705	4	3.28	0.0404	Significant Effect
Error	1.7277	0.11518	15			
Total	3.23852		19			

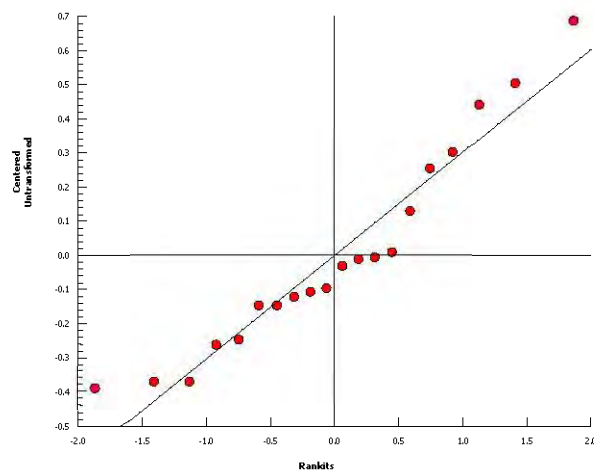
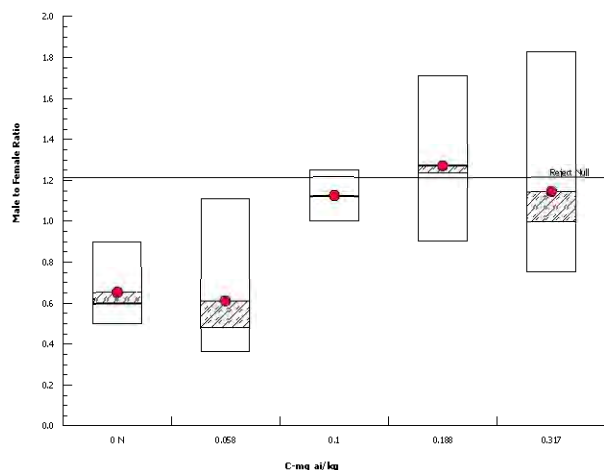
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.62	13.3	0.1571	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.928	0.866	0.1405	Normal Distribution

Male to Female Ratio Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.647	0.364	0.931	0.595	0.5	0.9	0.089	27.5%	0.0%
0.058		4	0.608	0.0663	1.15	0.48	0.36	1.11	0.17	56.0%	6.18%
0.1		4	1.12	0.96	1.29	1.12	1	1.25	0.0512	9.13%	-73.4%
0.188		4	1.27	0.584	1.96	1.24	0.9	1.71	0.216	33.9%	-96.1%
0.317		4	1.14	0.376	1.91	0.995	0.75	1.83	0.241	42.2%	-76.4%

Graphics



OPPTS 850.1760 Chronic Sediment Chironomus

Bayer Crop Science GmbH

Analysis ID: 01-2366-1829	Endpoint: Male to Female Ratio	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Parametric-Control vs Ord. Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C < T	NA	NA	69.8%	0.317	>0.317	NA	

Williams Multiple Comparison Test

Control	vs	C-mg ai/kg	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-0.167	1.75	0.421	6	>0.05	CDF	Non-Significant Effect
		0.1	0.906	1.84	0.442	6	>0.05	CDF	Non-Significant Effect
		0.188	1.47	1.87	0.448	6	>0.05	CDF	Non-Significant Effect
		0.317	1.62	1.88	0.452	6	>0.05	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1.51082	0.377705	4	3.28	0.0404	Significant Effect
Error	1.7277	0.11518	15			
Total	3.23852		19			

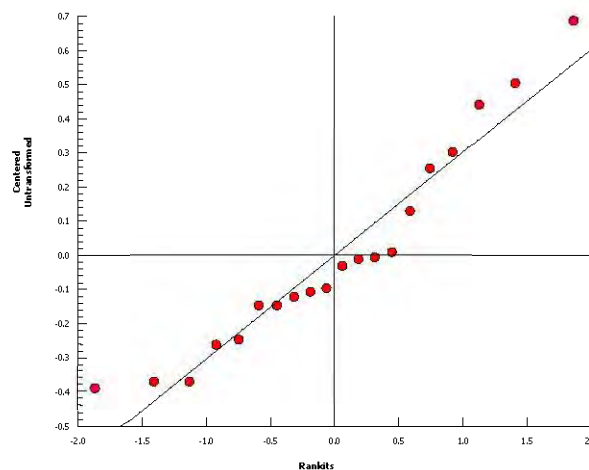
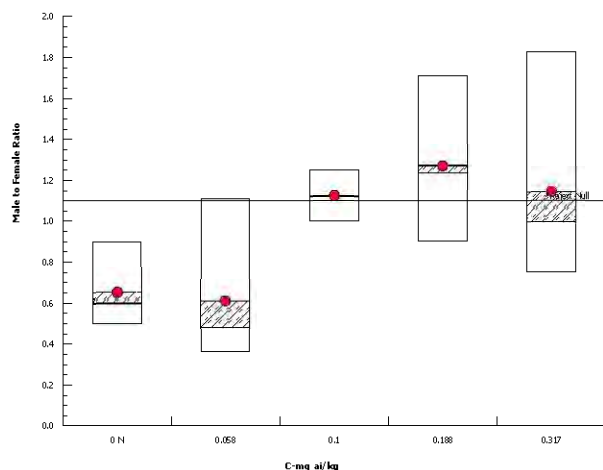
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Bartlett Equality of Variance	6.62	13.3	0.1571	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.928	0.866	0.1405	Normal Distribution

Male to Female Ratio Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.647	0.364	0.931	0.595	0.5	0.9	0.089	27.5%	0.0%
0.058		4	0.608	0.0663	1.15	0.48	0.36	1.11	0.17	56.0%	6.18%
0.1		4	1.12	0.96	1.29	1.12	1	1.25	0.0512	9.13%	-73.4%
0.188		4	1.27	0.584	1.96	1.24	0.9	1.71	0.216	33.9%	-96.1%
0.317		4	1.14	0.376	1.91	0.995	0.75	1.83	0.241	42.2%	-76.4%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 14 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 07-8864-3237	Endpoint: Percent Emerged	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:33	Analysis: Parametric-Two Sample	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	Test Result
Untransformed	NA	C <> T	NA	NA	11.1%	Passes percent emerged

Equal Variance t Two-Sample Test

Control	vs Control	Test Stat	Critical	MSD	DF	P-Value	P-Type	Decision(α:5%)
Negative Control	Solvent Blank	0	2.45	0.1	6	1.0000	CDF	Non-Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	8.881784E-16	8.881784E-16	1	2.66E-13	1.0000	Non-Significant Effect
Error	0.02	0.003333333	6			
Total	0.02		7			

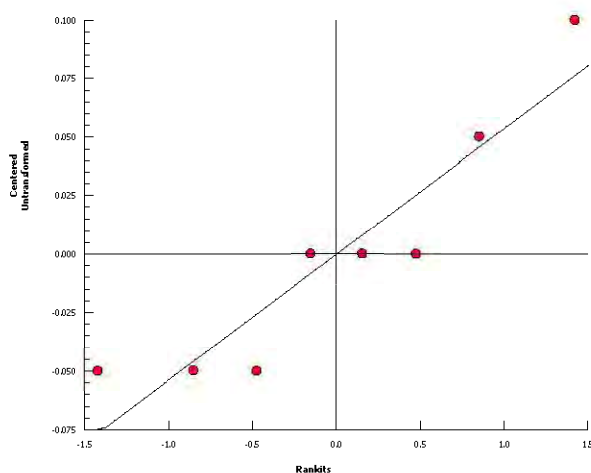
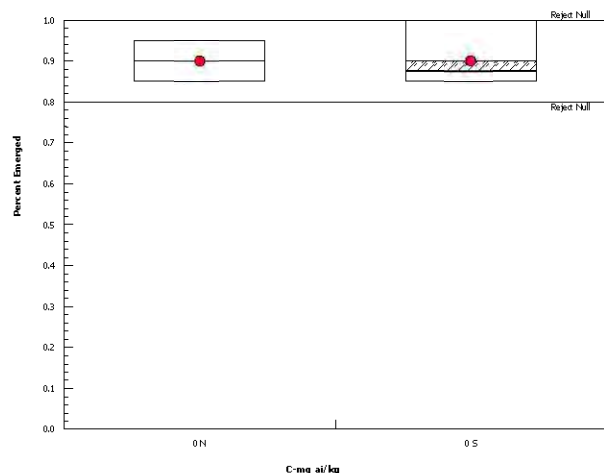
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Variance Ratio F	3	47.5	0.3910	Equal Variances
Distribution	Shapiro-Wilk W Normality	0.86	0.645	0.1199	Normal Distribution

Percent Emerged Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Solvent Blank	4	0.9	0.787	1	0.875	0.85	1	0.0354	7.86%	0.0%
0	Negative Control	4	0.9	0.835	0.965	0.9	0.85	0.95	0.0204	4.54%	0.0%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 15 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 02-9652-3633	Endpoint: Percent Emerged	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:34	Analysis: Nonparametric-Two Sample	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	PMSD	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	8.1%	0.317	0.704	0.4724	

Mann-Whitney U Two-Sample Test

Control	vs	C-mg ai/kg	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	3.5	NA	2	6	0.9857	Exact	Non-Significant Effect
		0.1	8	NA	3	6	0.6857	Exact	Non-Significant Effect
		0.188	3.5	NA	2	6	0.9857	Exact	Non-Significant Effect
		0.317	12	NA	2	6	0.1714	Exact	Non-Significant Effect
		0.704*	16	NA	0	6	0.0143	Exact	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.726771	0.5453542	5	194	<0.0001	Significant Effect
Error	0.050625	0.0028125	18			
Total	2.777396		23			

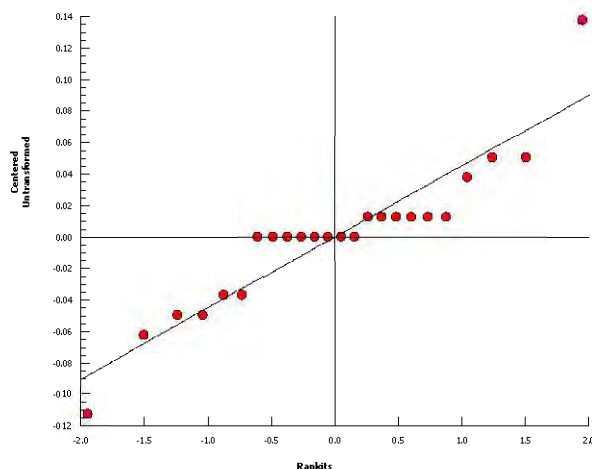
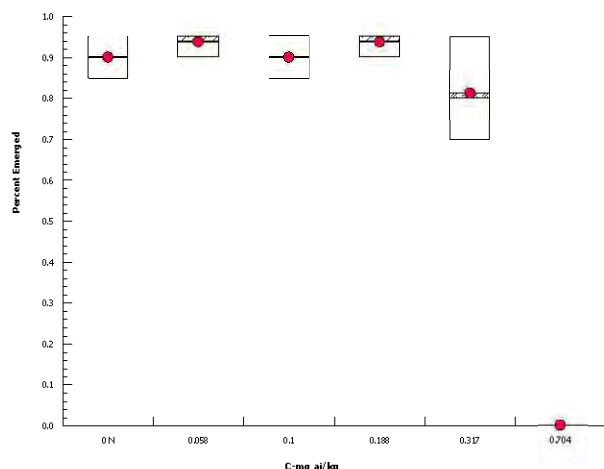
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	4.44	4.25	0.0082	Unequal Variances
Variances	Levene Equality of Variance	5.32	4.25	0.0036	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.891	0.884	0.0138	Normal Distribution

Percent Emerged Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.9	0.835	0.965	0.9	0.85	0.95	0.0204	4.54%	0.0%
0.058		4	0.937	0.898	0.977	0.95	0.9	0.95	0.0125	2.67%	-4.17%
0.1		4	0.9	0.835	0.965	0.9	0.85	0.95	0.0204	4.54%	0.0%
0.188		4	0.937	0.898	0.977	0.95	0.9	0.95	0.0125	2.67%	-4.17%
0.317		4	0.813	0.636	0.989	0.8	0.7	0.95	0.0554	13.6%	9.72%
0.704		4	0	0	0	0	0	0	0		100.0%

Graphics



CETIS Analytical Report

Report Date: 19 Jan-17 08:36 (p 16 of 16)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus Bayer Crop Science GmbH

Analysis ID: 11-7348-4313	Endpoint: Percent Emerged	CETIS Version: CETISv1.8.7
Analyzed: 19 Jan-17 8:35	Analysis: Nonparametric-Control vs Ord. Treatments	Official Results: Yes
Batch ID: 00-2895-8382	Test Type: Chronic Sediment Chironomus	Analyst:
Start Date: 13 Mar-14	Protocol: OPPTS 850.1760 Chronic Sediment Chiron	Diluent: Elendt M4 Medium
Ending Date:	Species: Chironomus dilutus	Brine: Not Applicable
Duration: NA	Source: Lab In-House Culture	Age: 1st

Data Transform	Zeta	Alt Hyp	Trials	Seed	NOEL	LOEL	TOEL	TU
Untransformed	NA	C > T	NA	NA	0.317	0.704	0.4724	

Jonckheere-Terpstra Step-Down Test

Control	vs	C-mg ai/kg	Test Stat	Critical	Ties	DF	P-Value	P-Type	Decision(α:5%)
Negative Control		0.058	-1.51	1.64	2	-2	0.9339	Asymp	Non-Significant Effect
		0.1	0	1.64	3	-2	0.8272	Asymp	Non-Significant Effect
		0.188	-0.943	1.64	3	-2	0.8272	Asymp	Non-Significant Effect
		0.317	0.715	1.64	3	-2	0.2374	Asymp	Non-Significant Effect
		0.704*	2.63	1.64	4	-2	0.0042	Asymp	Significant Effect

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	2.726771	0.5453542	5	194	<0.0001	Significant Effect
Error	0.050625	0.0028125	18			
Total	2.777396		23			

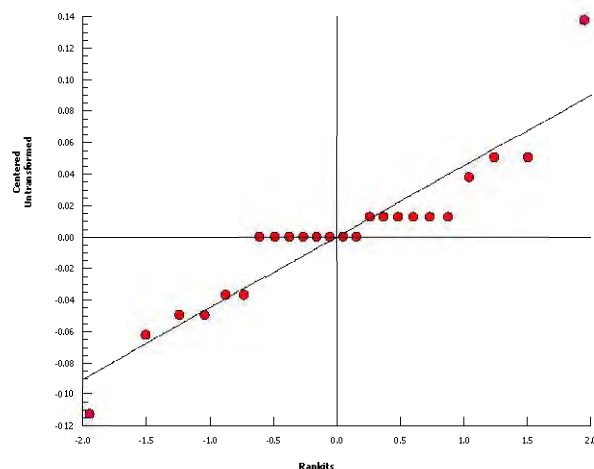
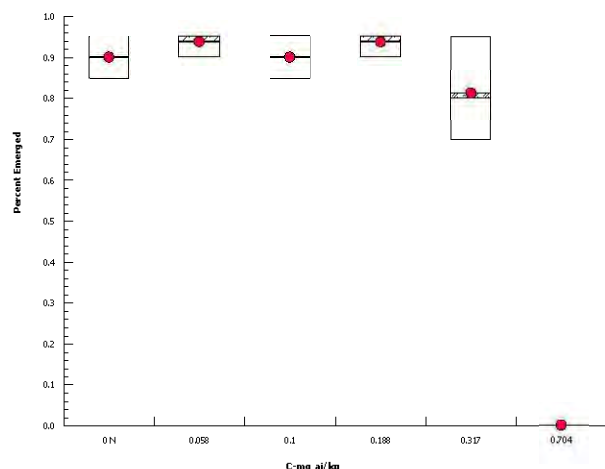
Distributional Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variances	Mod Levene Equality of Variance	4.44	4.25	0.0082	Unequal Variances
Variances	Levene Equality of Variance	5.32	4.25	0.0036	Unequal Variances
Distribution	Shapiro-Wilk W Normality	0.891	0.884	0.0138	Normal Distribution

Percent Emerged Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	Negative Control	4	0.9	0.835	0.965	0.9	0.85	0.95	0.0204	4.54%	0.0%
0.058		4	0.937	0.898	0.977	0.95	0.9	0.95	0.0125	2.67%	-4.17%
0.1		4	0.9	0.835	0.965	0.9	0.85	0.95	0.0204	4.54%	0.0%
0.188		4	0.937	0.898	0.977	0.95	0.9	0.95	0.0125	2.67%	-4.17%
0.317		4	0.813	0.636	0.989	0.8	0.7	0.95	0.0554	13.6%	9.72%
0.704		4	0	0	0	0	0	0	0		100.0%

Graphics



CETIS Summary Report

Report Date: 19 Jan-17 08:37 (p 1 of 3)
Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus

Bayer Crop Science GmbH

Batch ID:	00-2895-8382	Test Type:	Chronic Sediment Chironomus	Analyst:	
Start Date:	13 Mar-14	Protocol:	OPPTS 850.1760 Chronic Sediment Chiron	Diluent:	Elendt M4 Medium
Ending Date:		Species:	Chironomus dilutus	Brine:	Not Applicable
Duration:	NA	Source:	Lab In-House Culture	Age:	1st

Sample ID:	08-4403-5251	Code:	49617845 bulk	Client:	CDM Smith - J. Marton
Sample Date:	13 Mar-14	Material:	Transfluthrin	Project:	Insecticide
Receive Date:		Source:	Bayer Crop Science GmbH		
Sample Age:	NA	Station:			

Batch Note: PC Code 129140, MRID 49617845, TWA bulk sediment concentrations

Sample Note: PC Code 129140, MRID 49617845, TWA bulk sediment concentrations

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
07-1912-6648	Combined Development Ra	0	>0		9.84%		Equal Variance t Two-Sample Test
14-1577-9135	Combined Development Ra	0.188	0.317	0.2441	5.18%		Dunnett Multiple Comparison Test
02-0784-4476	Combined Development Ra	0.188	0.317	0.2441	4.13%		Williams Multiple Comparison Test
08-1244-4182	Female Development Rate	0	>0		9.26%		Equal Variance t Two-Sample Test
07-2018-2686	Female Development Rate	0.188	0.317	0.2441	5.96%		Dunnett Multiple Comparison Test
03-9093-0021	Female Development Rate	0.1	0.188	0.1371	4.76%		Williams Multiple Comparison Test
13-8031-0334	Male Development Rate	0	>0		5.89%		Equal Variance t Two-Sample Test
08-4234-5223	Male Development Rate	0.188	0.317	0.2441	5.74%		Dunnett Multiple Comparison Test
07-8402-8738	Male Development Rate	0.1	0.188	0.1371	4.58%		Williams Multiple Comparison Test
21-2424-6620	Male to Female Ratio	0	>0		163.0%		Equal Variance t Two-Sample Test
14-5925-0562	Male to Female Ratio	0.317	>0.317	NA	87.3%		Dunnett Multiple Comparison Test
16-8260-0285	Male to Female Ratio	0.1	0.188	0.1371	87.3%		Dunnett Multiple Comparison Test
01-2366-1829	Male to Female Ratio	0.317	>0.317	NA	69.8%		Williams Multiple Comparison Test
07-8864-3237	Percent Emerged	0	>0		11.1%		Equal Variance t Two-Sample Test
11-7348-4313	Percent Emerged	0.317	0.704	0.4724	NA		Jonckheere-Terpstra Step-Down Test
02-9652-3633	Percent Emerged	0.317	0.704	0.4724	8.1%		Mann-Whitney U Two-Sample Test

CETIS Summary Report

 Report Date: 19 Jan-17 08:37 (p 2 of 3)
 Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus

Bayer Crop Science GmbH

Combined Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	% Effect
0	Solvent Blank	4	0.0583	0.052	0.0647	0.0547	0.0639	0.00199	0.00398	6.83%	0.0%
0	Negative Control	4	0.0567	0.0532	0.0603	0.0546	0.0587	0.00111	0.00223	3.93%	2.74%
0.058		4	0.0576	0.055	0.0601	0.0562	0.0592	0.0008	0.0016	2.78%	1.29%
0.1		4	0.0604	0.0569	0.0639	0.0572	0.0619	0.00109	0.00219	3.62%	-3.56%
0.188		4	0.055	0.0522	0.0578	0.0535	0.0573	0.000877	0.00175	3.19%	5.66%
0.317		4	0.0524	0.0518	0.0529	0.0519	0.0527	0.000185	0.00037	0.71%	10.2%

Female Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	% Effect
0	Solvent Blank	4	0.0538	0.0486	0.0589	0.052	0.0586	0.00161	0.00322	5.99%	0.0%
0	Negative Control	4	0.0534	0.0495	0.0572	0.051	0.0556	0.00122	0.00244	4.57%	0.79%
0.058		4	0.0546	0.053	0.0561	0.0533	0.0555	0.000473	0.000947	1.74%	-1.44%
0.1		4	0.0561	0.0531	0.0591	0.0535	0.0576	0.000946	0.00189	3.37%	-4.32%
0.188		4	0.0508	0.0473	0.0542	0.0481	0.0527	0.00108	0.00216	4.25%	5.63%
0.317		4	0.0492	0.0464	0.052	0.0477	0.0515	0.000889	0.00178	3.61%	8.51%

Male Development Rate Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	% Effect
0	Solvent Blank	4	0.063	0.0587	0.0672	0.0596	0.0661	0.00133	0.00266	4.23%	0.0%
0	Negative Control	4	0.0623	0.0601	0.0645	0.0609	0.0642	0.000689	0.00138	2.21%	1.03%
0.058		4	0.0633	0.0586	0.0679	0.0614	0.0676	0.00147	0.00293	4.64%	-0.52%
0.1		4	0.0642	0.06	0.0684	0.0605	0.0664	0.00132	0.00263	4.1%	-1.99%
0.188		4	0.0588	0.0567	0.0609	0.0574	0.0603	0.000657	0.00131	2.24%	6.55%
0.317		4	0.055	0.0519	0.0581	0.0525	0.0573	0.000982	0.00196	3.57%	12.6%

Male to Female Ratio Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	% Effect
0	Solvent Blank	4	1.22	-0.128	2.56	0.55	2.4	0.423	0.846	69.4%	0.0%
0	Negative Control	4	0.648	0.364	0.931	0.5	0.9	0.089	0.178	27.5%	46.8%
0.058		4	0.608	0.0663	1.15	0.36	1.11	0.17	0.34	56.0%	50.1%
0.1		4	1.12	0.96	1.29	1	1.25	0.0512	0.102	9.13%	7.8%
0.188		4	1.27	0.584	1.96	0.9	1.71	0.216	0.431	33.9%	-4.31%
0.317		4	1.14	0.376	1.91	0.75	1.83	0.241	0.482	42.2%	6.16%

Percent Emerged Summary

C-mg ai/kg	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	% Effect
0	Solvent Blank	4	0.9	0.787	1	0.85	1	0.0354	0.0707	7.86%	0.0%
0	Negative Control	4	0.9	0.835	0.965	0.85	0.95	0.0204	0.0408	4.54%	0.0%
0.058		4	0.938	0.898	0.977	0.9	0.95	0.0125	0.025	2.67%	-4.17%
0.1		4	0.9	0.835	0.965	0.85	0.95	0.0204	0.0408	4.54%	0.0%
0.188		4	0.938	0.898	0.977	0.9	0.95	0.0125	0.025	2.67%	-4.17%
0.317		4	0.813	0.636	0.989	0.7	0.95	0.0554	0.111	13.6%	9.72%
0.704		4	0	0	0	0	0	0	0		100.0%

CETIS Summary Report

Report Date: 19 Jan-17 08:37 (p 3 of 3)
 Test Code: 49617845 bulk | 06-8510-5600

OPPTS 850.1760 Chronic Sediment Chironomus

Bayer Crop Science GmbH

Combined Development Rate Detail

C-mg ai/kg	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.0547	0.0565	0.0639	0.0582
0	Negative Control	0.055	0.0546	0.0587	0.0586
0.058		0.0587	0.0592	0.0562	0.0562
0.1		0.0617	0.0572	0.0619	0.0608
0.188		0.0535	0.0573	0.0538	0.0555
0.317		0.0526	0.0527	0.0522	0.0519
0.704					

Female Development Rate Detail

C-mg ai/kg	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.0521	0.052	0.0586	0.0524
0	Negative Control	0.051	0.0515	0.0553	0.0556
0.058		0.0555	0.055	0.0544	0.0533
0.1		0.0559	0.0535	0.0576	0.0574
0.188		0.0481	0.0527	0.0499	0.0523
0.317		0.0479	0.0477	0.0497	0.0515
0.704					

Male Development Rate Detail

C-mg ai/kg	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.0596	0.0633	0.0661	0.0628
0	Negative Control	0.0621	0.0609	0.0642	0.062
0.058		0.0615	0.0676	0.0614	0.0626
0.1		0.0664	0.0605	0.0657	0.0642
0.188		0.0595	0.0603	0.0581	0.0574
0.317		0.0552	0.0573	0.055	0.0525
0.704					

Male to Female Ratio Detail

C-mg ai/kg	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.55	0.67	2.4	1.25
0	Negative Control	0.55	0.5	0.64	0.9
0.058		1.11	0.5	0.36	0.46
0.1		1.25	1.11	1.13	1
0.188		0.9	1.57	0.9	1.71
0.317		1.83	1.11	0.88	0.75
0.704					

Percent Emerged Detail

C-mg ai/kg	Control Type	Rep 1	Rep 2	Rep 3	Rep 4
0	Solvent Blank	0.85	1	0.85	0.9
0	Negative Control	0.85	0.9	0.9	0.95
0.058		0.95	0.9	0.95	0.95
0.1		0.9	0.95	0.85	0.9
0.188		0.95	0.9	0.95	0.95
0.317		0.85	0.95	0.75	0.7
0.704		0	0	0	0